

Snap Freezer for ISS, Phase I

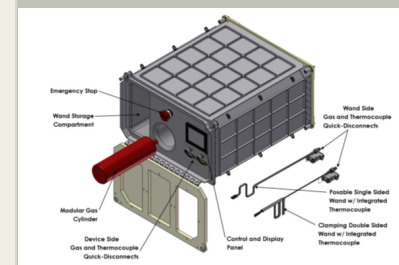
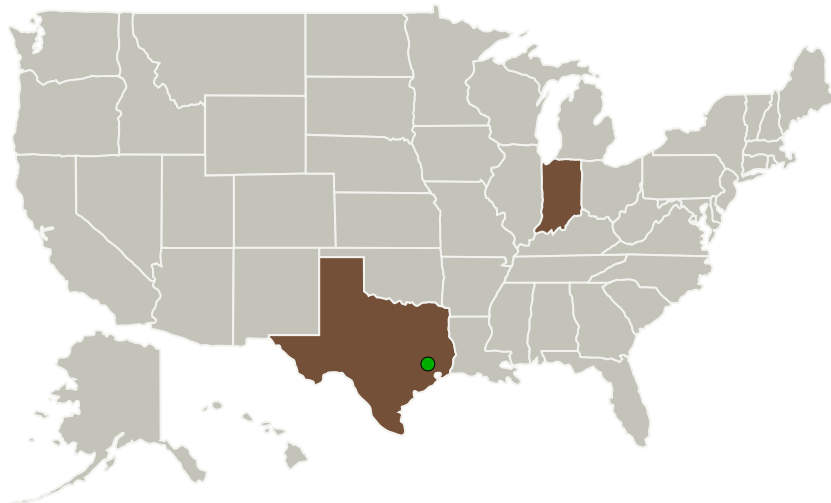
Completed Technology Project (2015 - 2015)



Project Introduction

Frozen tissue samples represent the state of the art in tissue preservation in many molecular analysis techniques as well as in membrane analysis using free-fracture techniques. Rapid or snap freezing eliminates the artifact caused by ice crystal formation within the tissues. Ice crystal nucleation and growth occurs between 0 degrees C and -20 degrees C typically. To avoid this damage and minimize destruction of proteins, RNA and DNA by lytic enzymes, cells or tissues have to be rapidly cooled through this temperature band. This is typically done in an isopentane bath cooled by liquid nitrogen (LN2) to -150 degrees C. This 2 step process eliminates artifacts caused by ice nucleation as well as artifacts caused by nitrogen bubbles that surround the tissue as it boils if submerged directly into LN2. While these open methods are acceptable for terrestrial laboratories, they would not be compatible with experimentation on the International Space Station. Our proposed argon based Snap Freezer clamp would provide an alternative means to rapid cool through ice crystal nucleation and growth temperatures without exposing the crew to the spill hazards of LN2 and chilled isopentane as well as the extreme flammability of isopentane.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Techshot, Inc.	Lead Organization	Industry	Greenville, Indiana
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Indiana	Texas

Project Transitions

▶ **June 2015:** Project Start

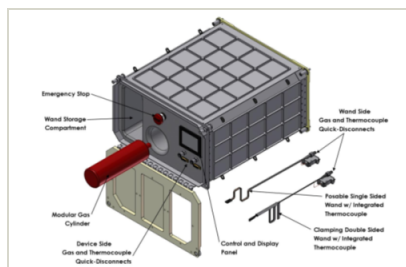
✓ **December 2015:** Closed out

Closeout Summary: Snap Freezer for ISS, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image(<https://techport.nasa.gov/file/139347>)

Images



Briefing Chart Image

Snap Freezer for ISS, Phase I
(<https://techport.nasa.gov/image/135408>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Techshot, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

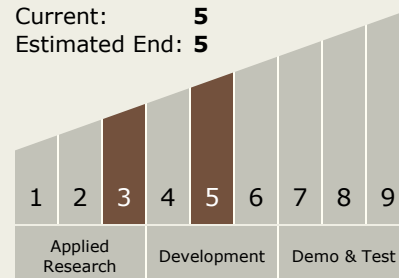
Carlos Torrez

Co-Investigator:

Eugene D Boland

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.4 Environmental Monitoring, Safety, and Emergency Response
 - └ TX06.4.2 Fire: Detection, Suppression, and Recovery

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System